Promoting Measure of Nursing Care Workload Through Computerization

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In order to obtain a global approach of the patient centered activity and relative costs, we propose to add to the DRG a care workload evaluation. Such an application was developed and integrated to the automated medical record implemented in each medical department of the hospital. The "Soins Infirmiers Individualisés à la Personne Soignée" (SIIPS) indicator was chosen to estimate nursing acuity. Implementation of the application in ten departments and first results permit to demonstrate the system feasability and the fiability of this indicator. These conclusions conducted us to propose the extension of this experimentation to all the clinical departments of the hospital before the end of 1995

INTRODUCTION

Objectives of hospitals are to provide high quality innovative patient care with a shrinking personnel base, a rationalization of hospital cost in the context of budgetary constraints and an increasing intensity service demand. To that end, it is necessary to develop methods of tracking and analyzing actual nursing hours of care by diagnosis and/or case-mix index and use these methods to provide a decision making tool to document hospital spending and address the complex staffing problems.

This paper presents the architecture and implementation of such a nursing acuity application integrated to the medical record to provide nursing management with an appropriate instrument for staffing and decision analysis. First, we describe the architecture of the system. We will not discuss the properties of the acuity system, but rather illustrate its implementation and use by nurses and administrators in conjunction with Diagnosis Related Group (DRG) information. Then, we present the software implementation. Finally, we discuss the inital results obtained after 6 months of use and conclude with the direction of future developments based on the first results of this implementation.

SYSTEM ENVIRONMENT

Saint-Louis University Hospital is one of the Assistance Publique-Hôpitaux de Paris (AP-HP) Hospital Institution. It is a 869 beds, public, academic health institution consisting of 26 clinical departments with an average of 26,673 inpatients admissions and 20,317 24-hour stays per year.

Various nursing systems have been proposed to classify patients by using a list of weighted nursing activity.[1-3] Saint-Louis Hospital chose the system called "Soins Infirmiers Individualisés à la Personne Soignée" (SIIPS).[4] The methodology of this measure of care workload is described elsewhere[4]. In summary, this system classifies patients into four levels of acuity for three categories of care. These three categories correspond to three types of nursing care: (1) basic care: diet, hygienic needs, locomotion and elimination; (2) technical care: medication and IV's, irrigation, drainage and other specific technical treatments; and (3) emotional and educational support. Methodology of this acuity system is based on four main principles: (1) care approach, (2) nursing staffing record, (3) classification of nursing care into different levels, (4) study of all components necessary to patient care.

This time-based patient system uses a list of critical indicators weighted to produce the workload measurements. Each category has an associated weight noted 1, 4, 10, 20, and representing four levels of patient dependance: absent, moderate, major and total. This score has been validated by calculating the time spent by the nurses with each category of patients[5]. A direct relationship was demonstrated among the different levels of acuity (20=2*10, 20 = 5*4 ...). Thus, it is possible to sum the different values from one level to the another during the patient stay. This information is obtained each week if the patient stay is longer than 7 days otherwise at the end of the stay. If the data are entered daily, the level calculated corresponds to the score most frequently observed during that week. This score is multiplied by the number of days (7 for each week period or number of days in case of stay shorter than one week). This calculation is performed for each of the three care categories. The sum of the three categories permits to define the global intensity of care required during the patient hospital stay.

DESIGN OF THE SYSTEM

The hospital objectives were to ask the nurses to enter daily into the system the score determined for the three categories for each patient. In order to obtain compliance of nurses with such system, different design goals were necessary: (1) the system aids the nurses in the patient management with such information as the differential diagnosis, the list of

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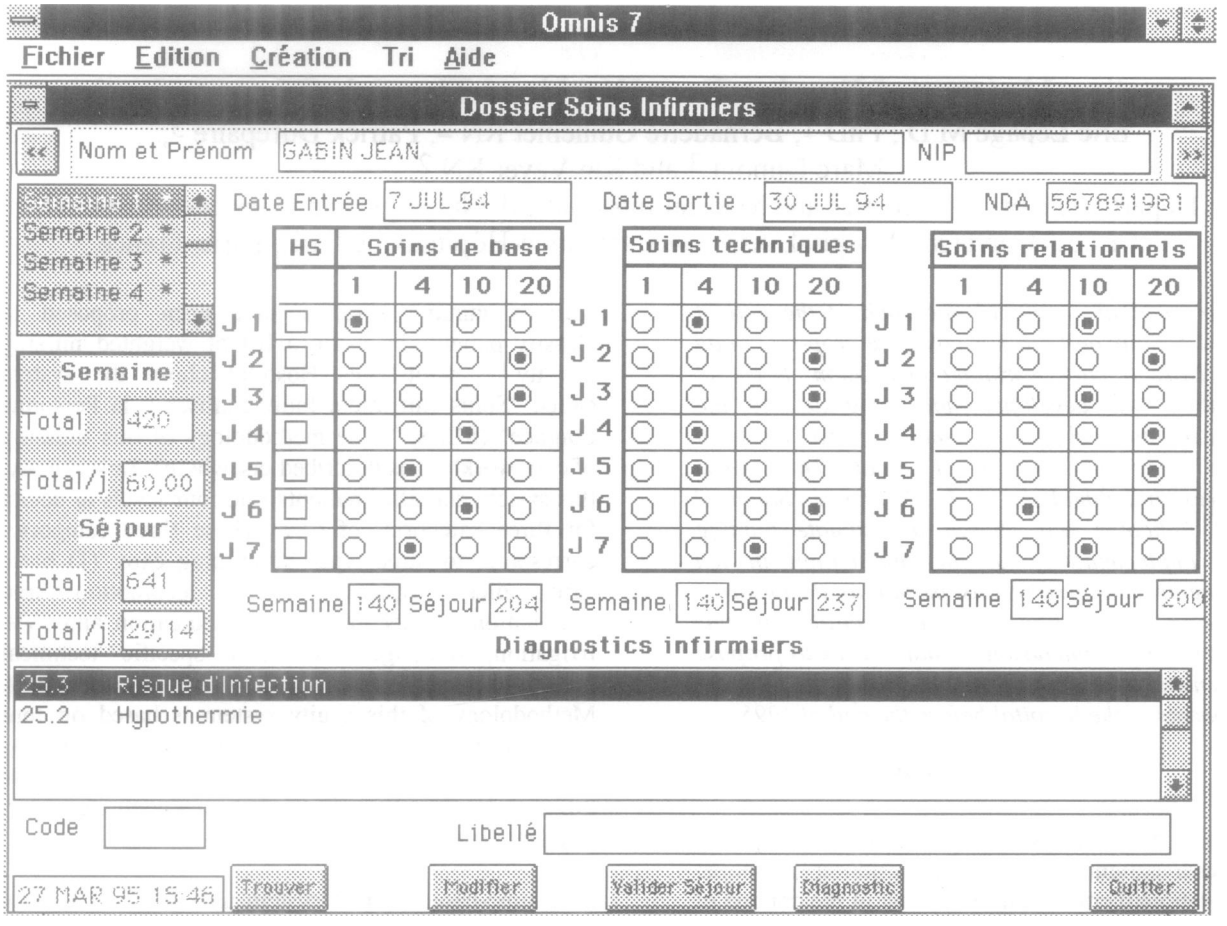

Figure 1 The main nursing window gives in the upper part the SIIPS score and in the lower part the nurse diagnosis

the ADT application. Control of data quality is performed by the chief nurse of the clinical department and the research nurse department of the hospital.

Insure the training of nurses.

Before implementation in each unit, the research nurse in charge of the project for the hospital organizes a meeting with the chief nurse, the nurses and the nursing assistants of the three consecutives shifts (day, evening and night). During meeting the objectives of the project are explained and the itenıs defining the levels of the three categories are defined precisely. Some criteria are defined in order to standardize the description of each level. This standardization is particulary difficult for the relational and educational component.

A chief nurse, in collaboration with the Department of Biostatistics and Medical Informatics, is in charge of the training of the nurses. All users are given a one-hour session on basic use of the computer and the application. At this time, we assess proper functionning and configuration of their computer and software options. Emphasis is placed on: how to access to application, how to get help, how to create nurse record and modify it. We covered the key elements in using the software. Users are then encouraged to use the program to reinforce the information.

Results

The experimental implementation of this system in clinical routine permited to conclude that nurses were, in general positive, about the system and found it very easy to use. Integration of this software to the medical application was appreciated, because of improved access to information. On the opposite, nursing diagnoses is not presently used, and should necessitate more nurse training in the information coding. This first experience demonstrated also that such system can be used in different ways at diffferent types of wards. At first, treatment of data permits to give informations to the users such as the representation of daily workload for each category of care. For exemple, figure 2 demonstrates the workload increase partialy associated to an increased number of hospitalization stay. Such results permit to

procedures ordered for the patient (transfusion, X Ray, specific lab exam), (2) insure that the nursing application is fast of access, easy to use and dose not require significant training, (3) the system produces an immediate and accurate feedback to referring nurses. These different constraints lead us to propose: (1) to capture nursing data on a single screen and permit choice of keyboard or mouse pointer, and (2) the integration of this application into the interfaced hospital information system, infrastructure consisting of interfaced applications, particulary the patient record software.

Determination of the information contributing to nurse care information.

A nurse committee was created composed of nurses, medical informatics personnel, administrator in charge of computers. In collaboration with the nurse committee, we defined an application that is integrated to the medical record system including administrative data, that decomposes the stay by weeks in order to facilitate the determination of the scores, that includes nursing diagnoses for the stay of patient according to NANDA classification[6], and that links the nurse record to a commercial spreadsheet software package permiting direct information retrieval by the user.

Application building

A specific application satisfying to these contrainsts was developed by the Department of Biostatistic and Medical Informatics. This application was built in Omnis database environment and incorporates data exchange capabilities with the unit patient medical record. Links with the medical and administrative patient database was obtained through the unique patient identification number and the administrative record number permiting to link data for the same admission. The nurse application included potential attributable score for each patient and each day of the week (Figure 1) and nursing diagnosis according to NANDA classification[6]. At the end of each week or the patient hospital stay, the system calculates the score for the week and the whole score. Access to a dictionnary containing the NANDA classification was developed. Export of data to a spreadsheet format was performed through the Dynamic Data Exchange (DDE). Macro building using Excel spreadsheet[8] permits automated treatment of data.

SYSTEM IMPLEMENTATION

The implementation consisted of three steps.

Validate the application

The first step consisted in validating the software and evaluating the possible treatments of information obtained in conjunction with the medical record. For that, an experimentation was started in October 1994 in five clinical departments, then extended to ten by the end of 1994. The following data were gathered: identification number, date of entry and discharge, daily level of care for the three categories. Nurses were coding these informations on a pre-formatted paper and were sending it once a week to the Nursing Department of the Hospital. Definition of the score was performed jointly by the day and evening shifts. The research nurse in charge of the project contolled the accuracy of data and entered it directly into the system. The nurses remarks and suggestions concerning software acessibility or information feedback tools were taken into account. The first results obtained after a three months period demonstrated 1) the accuracy of the method, particulary in term of the nurses staffing and the health care effectiveness, 2) the necessity of gathering information daily for a better anticipation of nurse workload and approach of patient follow-up.

Implement the software in the Medical Unit.

The nurse application was firstly implemented in 5 medical departments. It was integrated to the patient record and loaded on a Novell token ring network with 3 workstations (PC compatibles) and a dedicated server (Hewlett Packard). A Novell internal bridge was configured in the file server to set up these workstations on Ethernet. Each clinical department has a home directory to facilitate saving, retrieving and maintenance of files. All users in the same clinical service have access to a shared directory. All users are allowed access to the network, but specific restrictions are made by assigning Netware trustee rights and group assignements. Medical applications are secured by individual access rights. All programs are menu or pushbutton driven for ease of use. After selecting the patient, the nurse has access to the nurse application and clicks on the button corresponding to the patient score for each of the three categories. In case of hospital stay longer than one week, an upper left list indicates the different weeks created. Access to data related to the desired week is obtained by clicking on the corresponding line. After data validation, the system shows the score for the week and the whole stay for the three categories and the global intensity of care (Figure 1). All nursing diagnoses realized during the stay are entered in the lower part of the screen. On request, the user has access to an help window permiting selection of the correct nursing diagnoses from a list containing the NANDA classification. On request, the chief nurse has access to a second screen that permits to export to spreadsheet format the validated data associated to medical diagnosis according different criteria as the period of study or the medical unit. Nurses have access in read only mode to the medical informations entered by the physicians and the administrative data compiled from

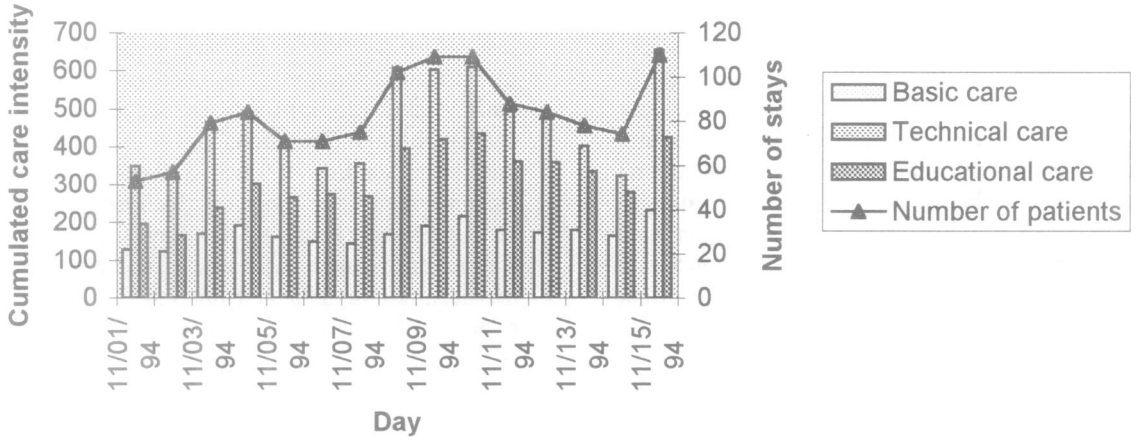

Figure 2 Care intensity observed for the three categories in a surgical department
Period from 11/01/94 to 11/15/94

optimize patient entry and/or nurse affectation. Secondly, these results are for the hospital decision makers and nursing department an important information source for a better evaluation of nursing activity for each department. Figure 3 displays the cumulative intensity for each category of care associated to an higher number of stays. In this exemple, department 4 presents a high level when considering the relational and educational category because its subspecialization in the field of diabetology and consequently the necessary training in diet and insulin injections. On the contrary, surgical departments are more centered on technical support. If we consider other departments like hematology or imunology, technical and relational categories are higher. Objective is to integrate these results into the yearly budget discussion between the board of hospital, the department of nursing and each medical unit.

Discussion.

The first results obtained after this initial experimentation demonstrated the acceptation of such a nursing acuity system. The use of a single screen devoted to nursing care permitted an easy surveillance of patient follow-up. The association of these data to the medical informations improve the clinical follow-up in terms of workload care measurement. The representation of daily workload was particulary appreciated by the nurses. The first results obtained by this experimentation confirm the perception of the nurses regarding the care workload and give a good representation of nursing care for the hospital nursing department and the board of the hospital.

Implementation of a nursing care measure lead the nursing staff to examine precisely the quality of information included in the nurse record. Particular attention was paid on report concerning basic and relational/educational care. The difficulty in integrating these informations motived the nursing staff to elaborate a nursing care plan, and an educational tool integrating the different levels of care. Coding rules were explained to each clinical department to facilitate standardization of data entry. A test period of 2 weeks, under the control of the research nursing department of the hospital, insured training in the use of the system and integrated the methodology necessary for quality data entry.

This nursing care acuity represents the care directly devoted to the patient and not the indirect care performed by the nurses (phone informations, appointment scheduling). A study of time devoted to this activity should permit to give to each clinical department an additional workload constant over time and independant of the reasons for patient stay.

CONCLUSION

The objective of the project was to integrate to the French DRG program nursing acuity system and estimate more precisely the hospital care devoted to patients. The benefits of the present system included: 1) integration of the nurse record in the medical workstation 2) automation of treatment of information feedback, and 3) a global approach of the patient.

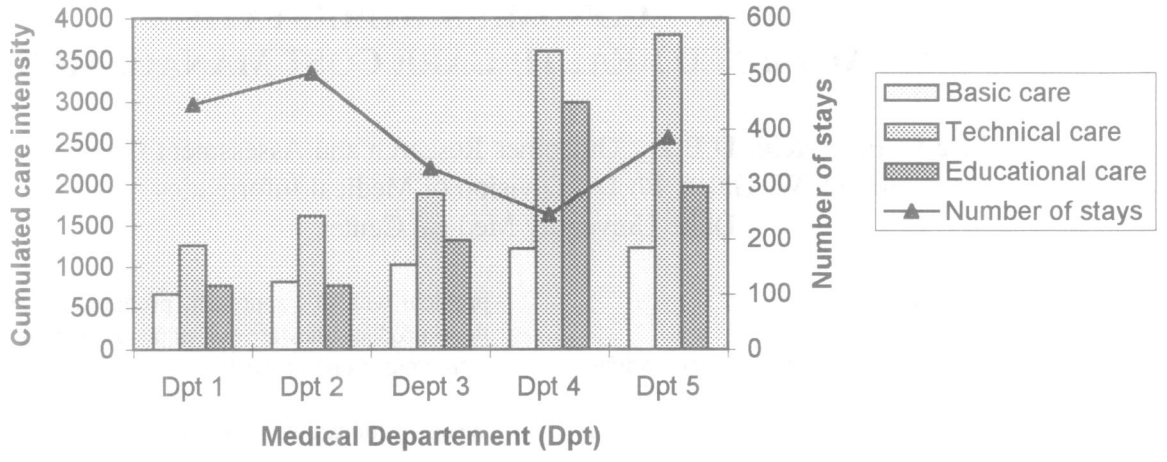

Figure 3
Care intensity observed for the three categories according 5 medical and surgical departments
Period from 11/01/94 to 12/31/94

The experimentation conducted in ten medical departments demonstrated the feasibility of implementing such applications and the compliance of the nurses to the system. The good compliance of nurses with data entry and the immediate feedback of information to the nurses has lead the Saint-Louis hospital to implement the nurse application in the ten experimental medical departments and extend the project to the entire hospital by the end of 1995. This extension to the hospital should permit not only inter service comparaisons and optimization of the management of personnel, but also clarify the discussions taking place in the clinical department concerning the workload attributable to each.

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Aknowledgments

The authors acknowledge O. Bouhaddou for his careful review of the manuscript.

References

1. Blaufuss J: Promoting the nursing process through computerization. In R. Salamon, B. Blum, & M. Jorgensen (Eds.), Proceedings of Medinfo 86, 585-586, North-Holland: Elsevier Science, 1986.
2 Thompson J: The measurement of nursing intensity, Health Care Financing Review, 1984, 47-55.
3. Tilquin C: P.R.N 80. Mesure du niveau de soins infirmiers. Editions de l'INSA, Montréal, 1980.
4. Beaughon MC: Les SIIPS. Présentation. Informations Hospitalières, 1993, 40, 19-21
5. Kholer F : La validation des SIIPS. Informations Hospitalières, 1993, 40, 25-34.
6. North American Nursing Diagnosis Association, NANDA Nursing Diagnoses: Definitions and classification, Philadelphia,: The Association, 1992.